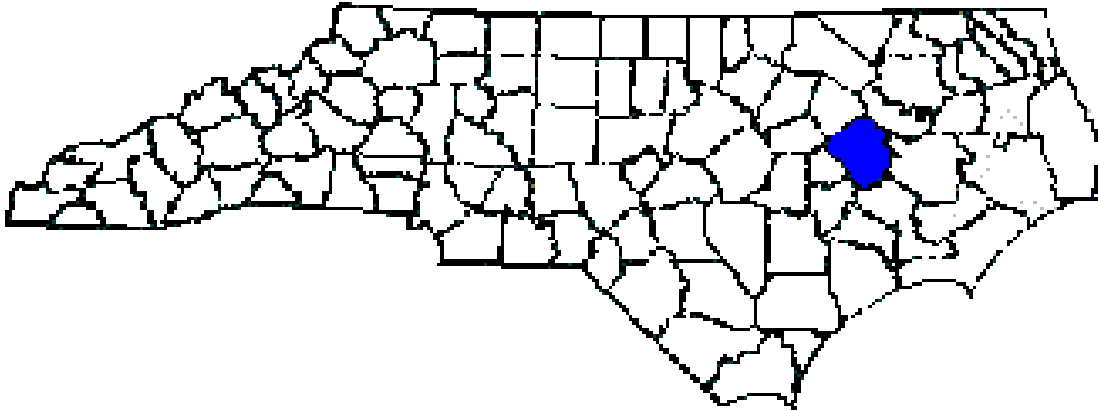


# ANNUAL REPORT FOR 2016



**Harris Mill Run Creek**  
**Pitt County**  
**TIP No. U-5018A**  
**USACE Action ID: 200900960**  
**DWR Project #: 20090261 v.1**



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August 2016

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Reforestation Plan

## **SUMMARY**

The following report summarizes the stream monitoring activities that have occurred during 2016 at the Harris Mill Run Creek Mitigation Site in Pitt County. Construction at the site was completed in February of 2013 by the North Carolina Department of Transportation (NCDOT). This report provides the monitoring results for the fourth formal year of monitoring (Year 2016). The Year 2016 monitoring period is the fourth of five scheduled years for monitoring on Harris Mill Run Creek (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring along Harris Mill Run Creek, the site has met the required monitoring protocols for the fourth formal year of monitoring. Based on the fourth year of monitoring data, the channel is stable throughout the stream at this time. The streambank and buffer are meeting planted vegetation success criteria for the fourth year of monitoring. A small area within the site along the bridge was mowed by contractors in January 2016. The mowed area was replanted in January 2016 following the reported encroachment. See Appendix B for photos of the replanted area.

NCDOT will continue stream and vegetation monitoring at the Harris Mill Run Creek Mitigation Site for 2017.

## **1.0 INTRODUCTION**

### **1.1 Project Description**

The following report summarizes the stream monitoring activities that have occurred during 2016 at the Harris Mill Run Creek Mitigation Site. The site is located along NC 43 just north of B's Barbeque Road in Greenville, NC (Figure 1). The Harris Mill Run Creek site was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number U-5018A in Pitt County.

The mitigation project covers approximately 100 linear feet of stream restoration. Water was turned into the restored channel on August 14, 2012 and streambank reforestation was completed on February 18, 2013 by the NCDOT. Stream restoration involved removing an existing culvert, construction of a new stream channel and construction of the floodplain to allow for overbank flooding. It also included the installation of coir fiber matting and live stakes along the streambank and bareroot seedlings in the buffer area.

### **1.2 Purpose**

In order for a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2016 at the Harris Mill Run Creek Mitigation Site. Hydrologic monitoring was not required for the site.

### **1.3 Project History**

August 2012	Water Turned into Channel
February 2013	Streambank Reforestation Completed
September 2013	Stream Channel and Vegetation Monitoring (Year 1)
September 2013	Surface Water Gauge Installed
July 2014	Stream Channel and Vegetation Monitoring (Year 2)
July 2014	Herbicide application on kudzu
August 2015	Stream Channel and Vegetation Monitoring (Year 3)
August 2015	Herbicide application on kudzu
September 2015	Herbicide application on kudzu
January 2016	Replanted area along bridge
August 2016	Stream Channel and Vegetation Monitoring (Year 4)

### **1.4 Debit Ledger**

The entire Harris Mill Run Creek Mitigation Site was used for the U-5018A project to compensate for unavoidable stream impacts at a 1:1 ratio.





**Figure 1.** Vicinity Map

## 2.0 STREAM ASSESSMENT

### 2.1 Success Criteria

The USACE permit requires NCDOT to follow the Onsite Stream Restoration, Planting, and Monitoring Plan. Two vegetation plots will be established after the project construction is complete, one located on each side of the restored stream channel. Results will be reported on an annual basis for five years with at least 320 stems per acre surviving through monitoring year three, 288 at year four, and 260 at year five. The stream channel stability shall be monitored for five years. NCDOT established one cross section along the 100 linear feet of stream restoration. Hydrology will be assessed throughout the 5-year monitoring period to determine the occurrence of bankfull events. A minimum of two bankfull events must be documented within the 5-year monitoring period and these must occur during separate monitoring years. A surface water gauge will be used to determine the occurrence of these bankfull events.

NCDWR permit **Condition #7** requires NCDOT to monitor the buffer mitigation site. Monitoring shall consist of visual review, photo evidence, and stem counts. An annual report shall be submitted to NCDWR for a period of 5 years showing monitoring results, survival rate, success of tree and vegetation establishment, and that diffuse flow through the riparian buffer has been maintained. The first annual report shall be submitted within one year of final planting. Failure to achieve a buffer density of 320 trees per acre after 5 years will require the annual report to provide appropriate remedial actions to be implemented and a schedule for implementation. Approval of the final annual report and a formal "close out" of the mitigation site by NCDWQ is required. **Condition #8** states the streambank shall be visually monitored for stability. Additionally, one cross section will be established within a riffle of stream restoration site and will be monitored for five years. A surface water gauge shall be installed and maintained for a three year monitoring period or until two separate bankfull events are recorded across two different monitoring years. Results will be included in the annual monitoring report.

### 2.2 Stream Description

#### 2.2.1 Post-Construction Conditions

The mitigation project covers approximately 100 linear feet of stream restoration. Water was turned into the channel on August 14, 2012 and streambank reforestation was completed on February 18, 2013 by NCDOT. Stream restoration involved removing an existing culvert, construction of a new stream channel and construction of the floodplain to allow for overbank flooding. It also included the installation of coir fiber matting and live stakes along the streambank and bareroot seedlings in the buffer area.

## **2.2.2 Monitoring Conditions**

The objective of the Harris Mill Run Creek Mitigation Site restoration was to remove an existing culvert on Harris Mill Run Creek while widening NC 43 and replacing the culvert with a bridge built on a new location to span the stream. Stream and riparian buffer restoration will be completed at the culvert removal site. One cross section in a riffle was surveyed for this mitigation site.

## **2.3 Results of the Stream Assessment**

### **2.3.1 Site Data**

The assessment included the survey of one cross section of the Harris Mill Run Creek mitigation site established by the NCDOT after construction. The location of the cross section is shown in Appendix A.

- ◆ Cross Section #1. Harris Mill Run Creek, midpoint of riffle

Based on the 2016 monitoring data, the one riffle cross section appears stable with little or no active bank erosion. The cross section shows a large deposit of sand along the left bank due to numerous bankfull events. The graphical representation of the cross section is presented in Appendix A. Future survey data will vary depending on actual location of rod placement and alignment; however this information should remain similar in appearance. Through visual observation, the channel appears stable throughout the mitigation site at this time.

A surface water gauge was installed at the site September 15, 2013 in accordance with the permit conditions to assess the hydraulic conditions present at the site. According to the 2014 monitoring report, numerous bankfull events were recorded at the site. Due to bank stability issues caused by the surface water gauge, it was removed in March of 2015.

NCDOT will continue monitoring for streambank stability at the Harris Mill Run Creek site in 2017.

## 2.4 Results of Stream and Buffer Vegetation

### 2.4.1 Description of Species

The following live stake species were planted on the streambank:

*Salix nigra*, Black Willow

*Cornus amomum*, Silky Dogwood

The following tree species were planted in the buffer area:

*Liriodendron tulipifera*, Tulip Poplar

*Platanus occidentalis*, American Sycamore

*Prunus serotina*, Black Cherry

*Betula nigra*, River Birch

### 2.4.2 Results of Vegetation Monitoring

**Buffer Vegetation:** Two 50 ft. x 50 ft. vegetation plots were set to determine the trees per acre in the buffer area.

**Table 1.** Vegetation Monitoring Results

Plot #	Silky Dogwood	Black Willow	Tulip Poplar	American Sycamore	Black Cherry	River Birch	Total (Year 4)	Total (at planting)	Density (Trees/Acre)
1	5	9	6	16	1	5	42	42	680
2	7	9	5	11	1	7	40	40	680
<b>Year 4 Average Density (Trees/Acre)</b>									<b>680</b>
Year 3 Average Density (Trees/Acre)									631
Year 2 Average Density (Trees/Acre)									639
Year 1 Average Density (Trees/Acre)									655

**Site Notes:** A small area within the site along the bridge was mowed by contractors in January 2016 and immediately replanted by NCDOT. Other vegetation noted onsite included sweetgum, soft rush, *Sagittaria* sp., fennel, lespedeza, goldenrod, baccharis, kudzu, cattail, pine, and various grasses. Small pockets of kudzu were encroaching into the planted area from the Northeast side of the site. NCDOT will continue to spray the kudzu throughout the monitoring period as needed. The kudzu was not affecting the overall performance of the planted trees at this time.

### **2.4.3 Conclusions**

There were two vegetation monitoring plots established throughout the buffer area. The 2016 vegetation monitoring of the site revealed an average tree density of 680 trees per acre. This average is above the minimum success criteria of 320 trees per acre after year four monitoring.

NCDOT will continue to monitor the vegetation at the Harris Mill Run Creek mitigation site in 2017. The kudzu noted onsite will continue to be sprayed throughout the monitoring period as needed.

## **3.0 OVERALL CONCLUSIONS/RECOMMENDATIONS**

The Harris Mill Run Creek mitigation site has met the required monitoring protocols for the fourth formal year of monitoring. The channel remains stable at this time. The streambank and buffer are meeting planted vegetation success criteria for the fourth year of monitoring. NCDOT will continue stream and vegetation monitoring at the Harris Mill Run Creek mitigation site for 2017.

## **4.0 REFERENCES**

U-5018A Onsite Stream Restoration, Planting, and Monitoring Plan

U.S. Army Corps of Engineers. Action ID SAW 2009-00960. TIP No. U-5018A NC 43 Widening 05/18/2009.

U.S. Army Corps of Engineers. Action ID SAW 2009-00960. TIP No. U-5018A NC 43 Widening Permit Mod 04/21/2014.

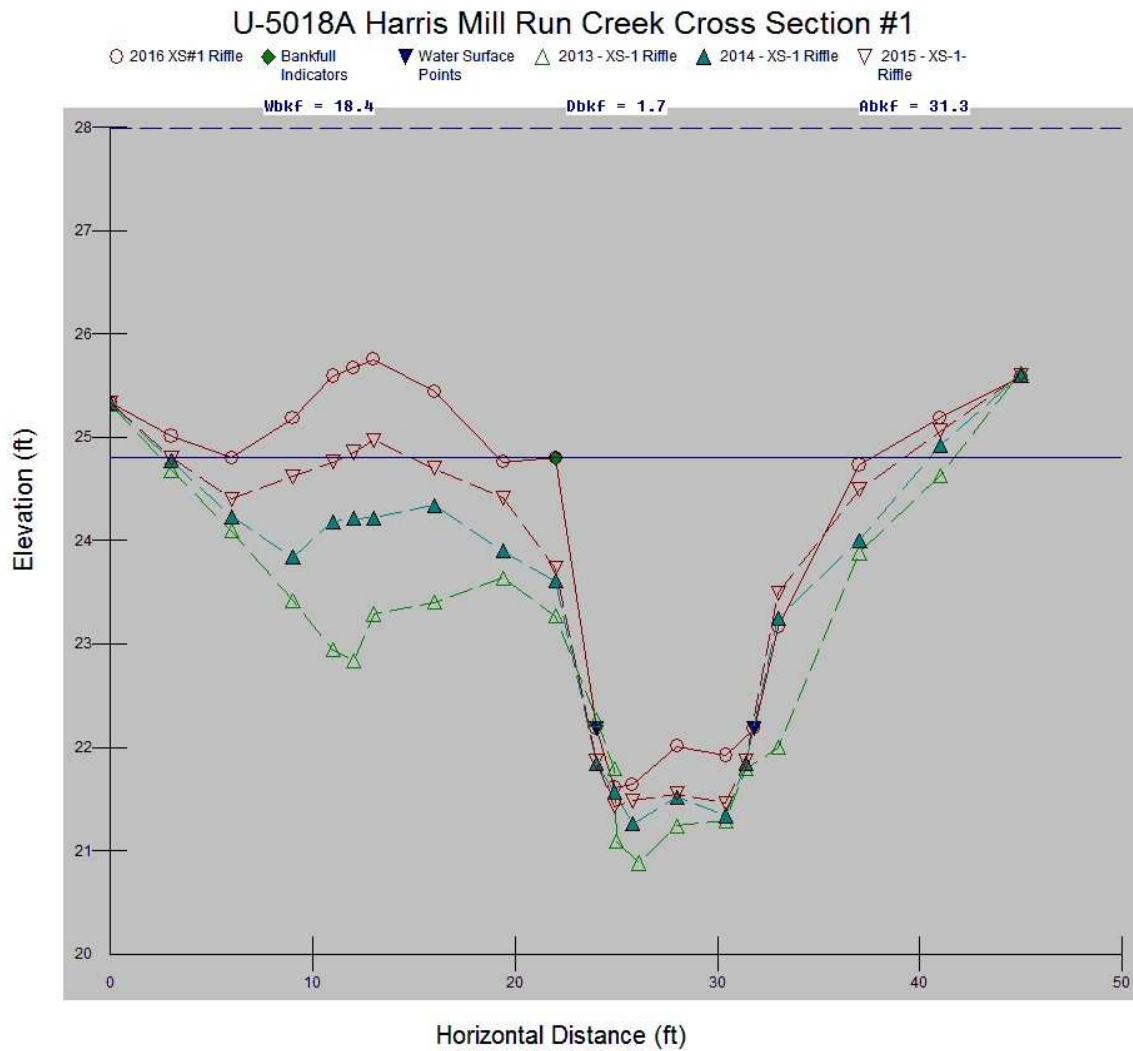
N.C. Division of Water Quality. NCDWQ Project No. 20090261 v.1 TIP No. U-5018A NC 43 Widening 05/30/2009.

Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. Prepared with cooperation from the US Environmental Protection Agency, NC Wildlife Resources Commission, and the NC Division of Water Quality.

**APPENDIX A**

**CROSS SECTION COMPARISON**



Cross-Section #1 (Riffle) Abbreviated Morphological Summary					
	2013	2014	2015	2016	2017
Bankfull Width (ft)	17.09	17.88	17.49	18.41	
Bankfull Mean Depth (ft)	1.47	1.34	1.71	1.7	
Width/Depth Ratio	11.63	13.34	10.23	10.83	
Bankfull Cross Sectional Area (ft <sup>2</sup> )	25.17	24.02	29.82	31.34	
Maximum Bankfull Depth (ft)	2.76	2.64	2.98	3.19	
Width of the Floodprone Area (ft)	45	45	45	45	
Entrenchment Ratio	2.63	2.52	2.57	2.44	



## **APPENDIX B**

**SITE PHOTOGRAPHS, VEGETATION PLOT, CROSS  
SECTION, PHOTO POINT, GAUGE LOCATIONS, &  
REFORESTATION PLAN**



# Harris Mill Run Creek



Photo Point #1 (Upstream)



Photo Point #1 (Downstream)



Overview Photo Looking Northwest



Overview Photo Looking Southeast

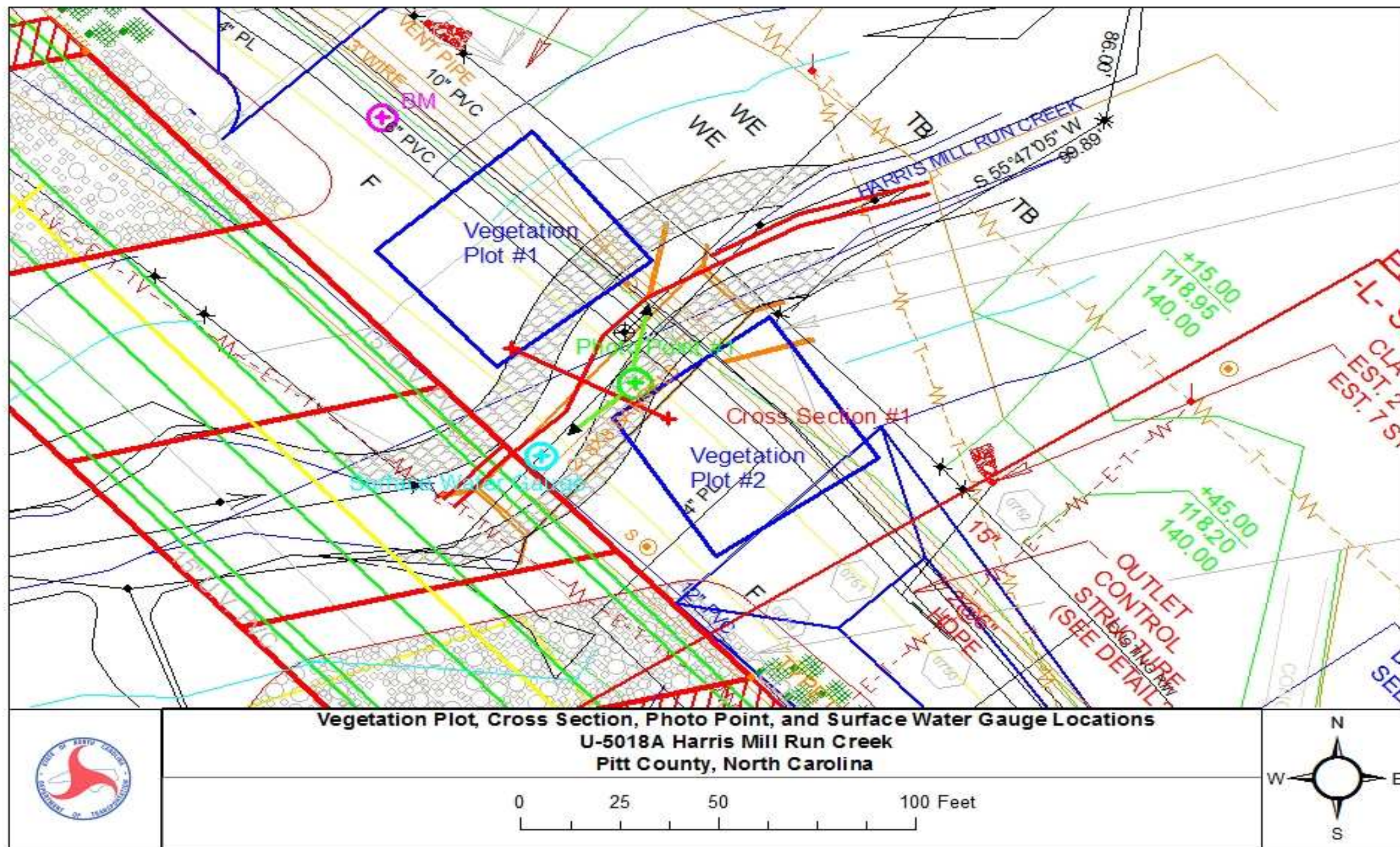


Wrack line noted along left bank  
August 2016

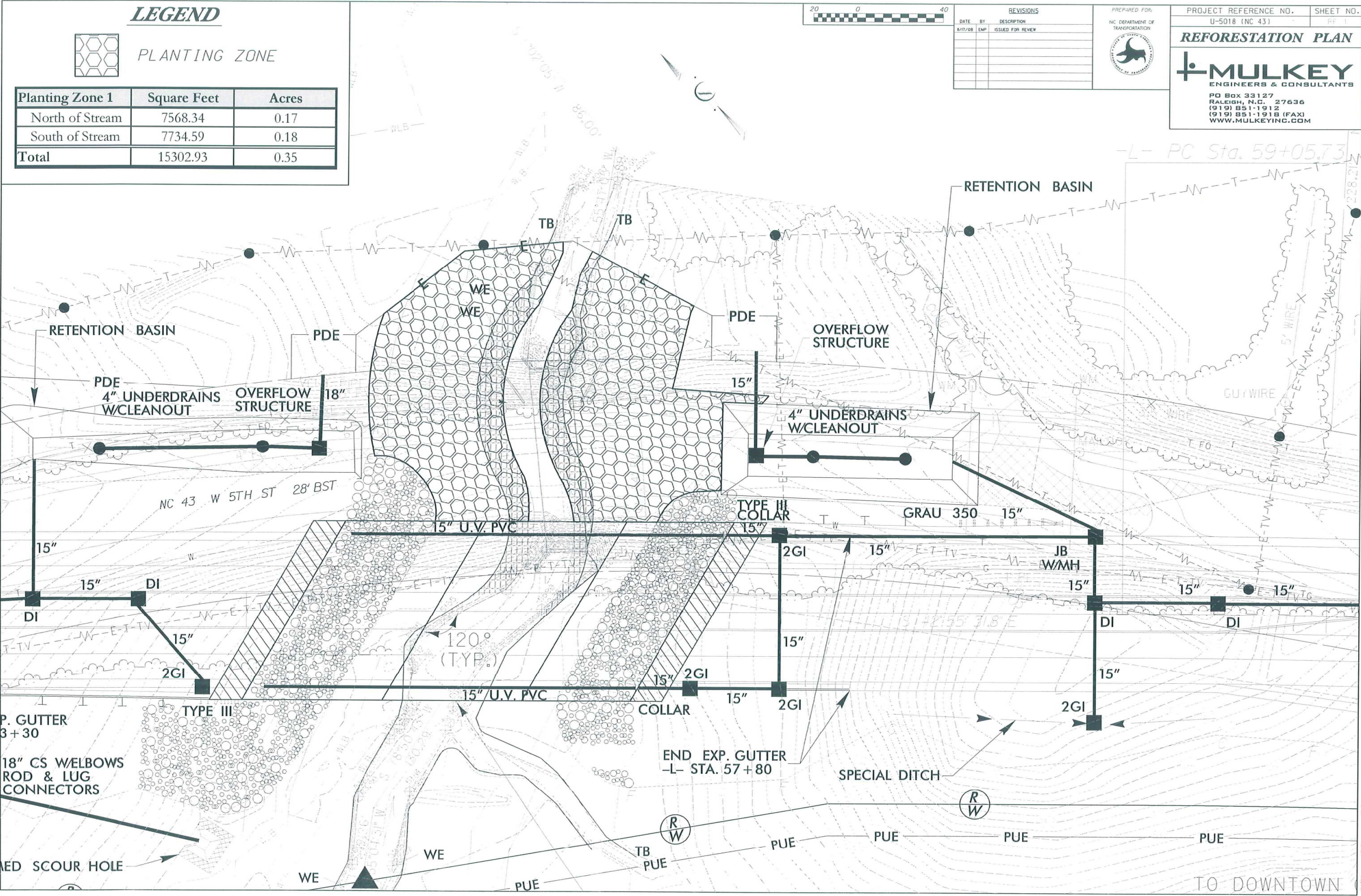


Mowed area that was replanted in January 2016









U-5018A Harris Mill Run Creek  
Reforestation Plan  
Pitt County, North Carolina